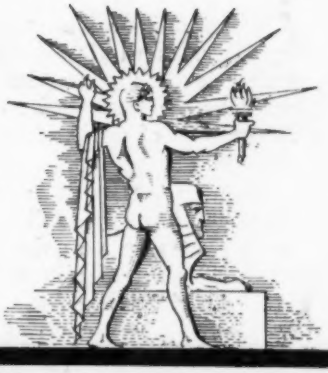
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •



March 21, 1942

Glow for Blackouts

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A SCIENCE SERVICE PUBLICATION

Do You Know?

The dark meat of chickens contains about twice as much *vitamin B* as the light meat.

Celtuce is a new species of vegetable which combines the flavors of lettuce and celery.

The *Navy* will eat 1,095,900,000 pounds of food this year, according to recent estimates.

Brazil is the world's only source of high-quality *quartz* crystals in substantial commercial quantities.

Japanese *landing operations* on the various Pacific fronts were rehearsed in operations in China since 1937.

In the State of Minas Geraes, Brazil, there is a mountain of *iron* containing between 12 and 15 billion tons of finest ore.

Entire supply of *goose* and *duck* feathers, used for pillows and sleeping bags, has been diverted to war orders by the War Production Board.

Technical films illustrating *shipbuilding skills,* from laying of the keel to the fitting of deck plates, have been prepared by the U. S. Office of Education for training of novices.

Drying agents, such as calcium chloride, may prove able to disburse *fog* over limited areas such as the last hundred feet of descent of airplanes—the agent is sprayed in concentrated, liquid form.

Insects continually undo the work of a million men.

Rubber compressed to the hardness of steel can quickly cut and shape intricate metal pieces with precision.

Classes to train Army Air Force officers in the *questioning* of enemy prisoners have been organized at the University of Maryland.

Eastern *aircraft* makers are hiring workers three times as fast as they did a year ago, according to the Aeronautical Chamber of Commerce.

There is more vitamin D in *eggs* than in any other foodstuff.

Early Egyptian *boats* were built of bundles of papyrus reeds smeared with mud and slime.

Enough burlap and a similar material, osnaburg, to encircle the globe more than eight times has been purchased by the War Department for *sandbags.*

Wind-blown spores, pollens and bacteria, some only 1/25,000 of an inch in diameter, may aid weather experts in tracing movements of *air masses.*

QUESTIONS DISCUSSED IN THIS ISSUE

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IMMUNOLOGY

Antibodies Induced To Form In Laboratory Glass Vessels

Results of Experiments Confirm Theory on Production Of Antibodies in Blood of Living Persons and Animals

FOR THE FIRST time in medical history, disease-fighting blood substances known as antibodies have been formed artificially in laboratory flasks. Hitherto these protectors against germs and viruses have been formed only within the bodies of living persons and animals.

The new feat of inducing their production in glass vessels was performed in the laboratories of the California Institute of Technology by a three-man research team, Prof. Linus Pauling, Prof. Dan Campbell and Dr. David Pressman.

Up to the present time, the experiments have not been carried far enough to discover whether or not it will be possible to prepare these protective solutions in the laboratory for general clinical use, although exploratory work along these lines is already under way. The immediate value of the research lies in its contribution to a better understanding of the biochemistry of the reactions of blood proteins to the presence of disease-causers that result in the formation of protective antibodies.

According to the theoretical picture conceived by Profs. Pauling and Campbell and Dr. Pressman, antibodies are formed by the modification in shape and structure of the large molecules of certain blood proteins, known as serum globulins, which takes place in the presence of disease germs or virus particles. They envision the complex structure of the molecules forming in the presence of the disturbers with certain changes that enable them to seize hold of the offenders and render them harmless—like policemen with a grip on a criminal's collar. The modifications in molecular form of the globulins enable them to perform such arrests whenever the blood is invaded by germs or virus particles like those that modified them originally.

In the experiments, serum globulins were induced to "unfold" their molecules by heating or treatment with alkali, in the presence of an antigen, or disease-provoking agent. Then the unfolding force was slowly withdrawn, permitting the molecules to re-fold themselves, but with modifications in their structure due to the provocative presence of the antigen.

It was found that a protein solution subjected to this treatment acquired the various characteristics of a natural blood serum which would be obtained from an animal which had been immunized with the same antigen. The investigators have prepared in this way antibodies against various simple chemical antigens, and also against a complex sugar-like compound from pneumonia germ cultures.

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PUBLIC HEALTH

Americans "Misled" by Early Rejection Figures

THE AMERICAN people have been unnecessarily disturbed over the health of their youth by early statements regarding rejection of young men by the armed services and Selective Service for physical defects, according to statisticians of the Metropolitan Life Insurance Company.

The company states that "the American people can definitely be assured that the charge sometimes made, that 45% of our young men are physically unfit, is entirely unfounded. This figure, which is based on the very rigid standards of selection used while we were still at peace, is wholly misleading as an indication of the health of our youth."

The statisticians add that American youth, by more reasonable standards, will measure up to the hard tasks they face, and when properly trained will prove superior in stamina and endurance to their enemies.

Meanwhile, the new lower standards under which men are now admitted to the Army and Navy will be compensated for by correction of minor physical defects by service physicians.

Col. Leon Gardner of the Office of the Surgeon General of the War Department said he agreed "that American youth will prove superior in stamina and endurance to their enemies after proper training."

Col. Gardner likewise pointed out that early physical standards of the armed services and the Selective Service were peacetime standards and so "extremely rigid."

"At that time," he said, "we wanted maximum health, and set the standards for physical fitness deliberately high.

"We are the best-fed nation in the world, and our standards of living are the highest. It is ridiculous to suppose we are a nation of weaklings."

Science News Letter, March 21, 1942

THE "MARINER"

This new long range patrol bomber built by Glenn L. Martin Company for the U. S. Navy is one of three types on which the Martin Company will concentrate production. It is bigger and more powerful than the PBM-1 but has the same gull-shaped wings and toed-in rudders. Performance details and specifications are not released.

AERONAUTICS

CAA Is Searching For Crash-Proof Gasoline Tank

Advances in Bullet-Proof Fuel Tanks Have Stimulated Research on Tanks That Will Not Cause Explosions

FUEL tanks of air transports of the future will not spray burning gasoline to add to crash horrors if research work now under way achieves success.

The Civil Aeronautics Administration is now studying this problem and John W. Baird, CAA engineer, asked for comments and suggestions from the industry in a paper before the National Aeronautics Meeting of the Society of Automotive Engineers in New York.

Recent advances in bullet-proof and self-sealing fuel tanks on military and naval airplanes have stimulated anew the work of developing for commercial craft tanks that will not cause explosions and fire after accidents.

The type of fuel tanks now used for military planes does not offer the best solution of a crash-proof tank for civil airplanes, Mr. Baird said, because the increase in weight due to the adoption of self-sealing tanks in an airplane of a fuel capacity of 1,000 gallons would amount to around 1,000 pounds.

Various types of crash-proof tanks now being developed, it is expected, will compare in weight with conventional metallic tanks.

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Birds a Hazard to Planes

COLLISION with birds, particularly large specimens, is a real hazard to transport planes, sometimes causing destruction of the plane and threatening the life of pilot or passengers, Allen L. Morse, chief of the aircraft development section of the Civil Aeronautics Administration, told the national aeronautic meeting.

Airplane accidents involving bird collision, Mr. Morse said, have amounted to 61 since 1939, two-thirds of which occurred at night, and more than one-third shattering or penetrating the windshield.

Mr. Morse told of one pilot whose plane collided with a flock of five swans at night. One swan penetrated the leading edge of the left wing; the second almost tore off the left vertical stabilizer, jamming the rudders, the third swan struck and dented the engine cowl, and later two swans went through the propeller. A portion of a swan, taken from the wing after landing, weighed 11½ pounds. Wild swans weigh as much as 20 pounds.

Such reports show that impact forces in collisions with birds are enormous. Even small birds, Mr. Morse went on, not only have penetrated the windshield, but in one instance continued through the bulkhead, traveled the length of the cabin, penetrated the rear cabin wall, and lodged finally in the baggage compartment. Fortunately in this case neither passengers nor crew were struck.

For use in tests to devise adequate protection against birds, Mr. Morse called for development of a high-pressure air catapult which could shoot freshly-killed carcasses against a plane windshield, thus simulating actual flight-collision. Freshly-killed birds are necessary, since their bodies offer the same resistance as live birds.

Meanwhile windshield combinations of glass and plastics offer some protection. It is to further test these combinations that the high-pressure catapult is needed.

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AERONAUTICS

Two-Engine Transition Training Plane Designed

A NEW type of transition training plane, to bridge the tremendous gap between the ordinary light trainer and the complex, heavy, two- or four-engine tactical plane, with its multiple instruments and controls, has been designed by the Army Air Corps, it is announced at Wright Field. Another new type of training plane is designed especially for the instruction of navigators and bombardiers.

To try to fly a multi-engine airplane immediately after completion of training in single-engine trainers, officials said, would be something like trying the big jump after the first few skiing lessons.

A composite view of the four new models of pilot-trainers, just announced, would show a low-wing monoplane with a 40-foot wing span and powered with two radial engines in the 270-horsepower class. They have the same general performance and operation characteristics of their tactical big brothers, and a gross weight of 5,125 pounds.

TRANSITION TRAINER

Pilots who have learned to fly in a small single-engine training plane will now be able to continue their training in a two-motor trainer having the general handling characteristics of larger heavy multi-engine fighters and bombers. This AT-8 (Cessna) is the first twin-engine transition trainer produced for the Air Corps from designs just announced at Wright Field. The photograph is an official Army Air Corps picture.

FOR BOMBARDIERS

Combat crews may now receive instruction in an airplane having many characteristics of the newest tactical craft. This AT-11 (Beech) is equipped with machine gun turret and bomb racks. The photograph is an official one released by the Army Air Corps at Wright Field.

As much as 2,000 pounds heavier, and developing 75% more power than pilot-trainers, are the two new models designed for navigator-bombardier training. One of these carries a crew of five and is equipped with a chart table, a periodic compass, stabilized drift sight for student naviagtors and a celestial navigation dome for sextant readings.

The other, which carries a crew of three or four, has a machine gun turret and bomb racks.

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POPULATION

Japan and Germany May One Day Be Enemies

In Addition To War of Machines, Battle for Numbers In Population Is Waging Between the East and West

UNDER cover of this war of machines, a battle for superiority in population increase is taking place between the East and the West, with the East easily the victor—a fact which one day may bring Japan and Germany face to face in an epochal strife for world dominance. These are the views of Dr. W. S. Thompson, of Miami University, Oxford, Ohio, Director, Scripps Foundation for Research in Population Problems.

Dr. Thompson points to India, where the multitudes have increased by 48 millions during the past decade, the largest population increase in India's history. Her total population now stands at about 400 millions, three times that of the United States.

By comparison, the United States has done poorly. Our greatest population increase was only 17 millions in the decade, 1920-30, an increase of 16.1%. In the decade during which India's people increased 48 millions, we increased only about 9 millions, according to the latest census. The rate of increase for this decade was only 7.2%.

Concealed in these figures for the United States is a steadily declining birth rate. Our population increases only because our death rate has dropped nearly as fast, while immigration made up the difference.

But immigration into the United States has virtually ended. Whether it will ever begin again and reach its former proportions, no one can now say.

Behind this increase in Eastern peoples and decline in Western peoples are industrial causes, Dr. Thompson believes. As a nation becomes industrialized, earns greater income, its sanitary measures improve and its death rate drops sharply. The decrease in deaths, for a time, more than makes up for the simultaneous decrease in births due to industrial society. This decrease in births is due to the population shift from farms to the cities where contraceptive information and devices are more readily had.

Western nations passed through this phase of development in the last century and early in this century. But the East is just beginning to become industrialized, Japan far in the lead, of course. Industrialization of the East will certainly be sped by a Japanese victory. But there is a great difference in industrial potentialities between the East and the West, Dr. Thompson points out.

The East has less iron and coal resources than the West. Hence industrialization can only go so far, and it thus becomes doubtful if the East will ever develop as great an urban population. Even Japan, whose population has to a great extent shifted to the cities, cannot equal Germany or the United States in urban population.

India, however, is 30 years behind Japan in development of her industries. India's dawning industrial era, plus the sanitation efforts of Great Britain, are, Dr. Thompson believes, the reason for the 48 millions population increase of this past decade. In the previous decade, India's population increased from 318 millions to 352 millions, an increase of only 34 millions.

Combining these facts, Dr. Thompson reaches an over-all picture of Western population decline, and a swiftly growing, gradually industrialized East. One day, Dr. Thompson concludes, this trend may bring Japan and Germany face to face in a war for world dominance.

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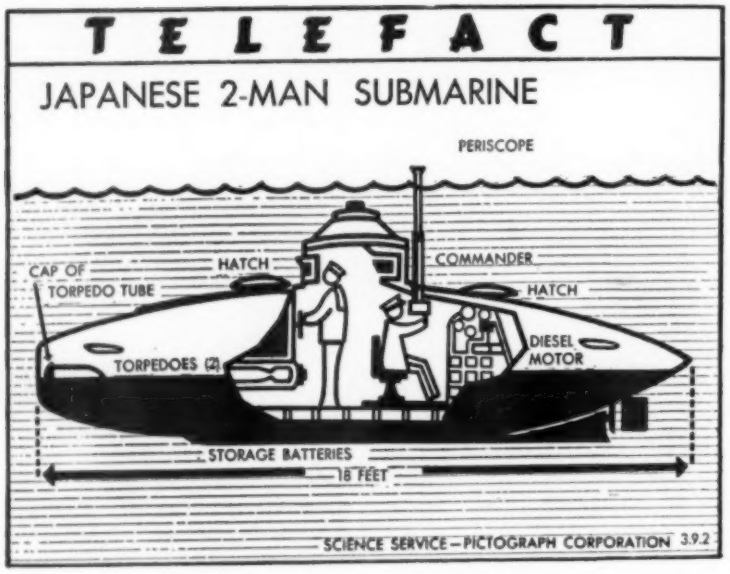
For years *barn owls* have nested in one of the towers of the Smithsonian Institution in Washington.

The *house wren* will sometimes build its nest in an old hat, an empty tin can, or in the coatpocket of a scarecrow.

That old saying about dew in the morning being a sign of clear *weather* is backed by scientific evidence—when the night sky is cloudy, little or no dew is precipitated.



ANTHROPOLOGY

Blueprint For World Peace Needed Now, Say Scientists

World Federation Based on Democratic Equality of Brown, White and Yellow Races Considered Necessity

UNLESS we prepare for peace now, we can never hope to see an end to war. This was the conclusion of anthropologists speaking before the American Academy of Arts and Sciences in Boston.

"A world federation based on democratic equality of brown, white and yellow races is no longer an ideal," said Dr. Eliot D. Chapple of Harvard Medical School. "It has become a realistic necessity." Dr. Chapple is president of the Society for Applied Anthropology.

"If we wait for victory before planning the post-war world, it will be too late," he warned. "Temporary measures automatically become part of the permanent structure, and are apt to breed new wars just as the Treaty of Versailles did."

The Versailles peace settlement not only failed to live up to its ideals, but the ideals were based on the outmoded production methods of the 19th Century. Yugoslavia was cited by Dr. Chapple as example of trying to unite peoples on the basis of language alone. The Croats and Serbs have never been able to unite because of their fundamental geographical and technological differences.

Technological unity in world planning, rather than language or racial similarities, was stressed by Dr. Conrad M. Arensberg of Brooklyn College. The greatest change in Russia came about "not when the Tsar was assassinated, but when the tractor was introduced." The fact that industrialization is proceeding at different rates of speed in different countries makes it necessary, according to Dr. Arensberg, to plan along democratic lines, using local institutions wherever they exist. Sudden changes imposed by totalitarian methods would even further dislocate the post-war world.

"Two wars have been caused by our total lack of planning," Dr. Carleton S Coon, Harvard anthropologist, charged. "Even now we are content to leave the whole subject of planning to the economists and engineers, forgetting that we are dealing with the behavior and interactions of human beings. The physiological needs of human beings are the same everywhere. We no longer have any 'primitive' races to conquer and exploit."

"We must learn the bitter lesson," said Dr. Chapple in his paper, "that we have to plan for human beings, and not for 'economic men' or 'political animals' or 'men of good will.' We have to plan for people as they actually behave, not as we think they ought to be."

Dr. Chapple envisioned a post-war world federation with possession of an armed police force, divided according to geography and technology rather than race or language, and containing economic equality for all peoples hitherto considered "primitive" or backward.

"Germans and Japanese must be included," said Dr. Chapple, "however painful and bitter our feelings toward them. Their totalitarian systems drove them automatically on their present course. It is of fundamental importance that, this time, some positive action shall be taken to insure them a democratic system of their own."

Dr. Chapple and Dr. Arensberg both believe that democratic methods provide the only safe and efficient way to introduce the technological changes necessary in world-scale planning. "The usual criticisms of democratic inefficiency," said Dr. Chapple, "are due to the fact of having too little democracy. Inefficient organization results from the existence of totalitarian sub-systems within a society, which operate to prevent full democracy."

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OCEANOGRAPHY

Lost Buoys, Made of Mine Casings, Adrift in Gulf

SHIPS in the Gulf of Mexico may sight what appear to be floating mines but are really only harmless buoys made of the casings of obsolete mines, the U. S. Coast and Geodetic Survey warns. Last year, parties of Survey workers, on duty near the Gulf coast, used some of these spherical mine cases for floats for a marker needed in their work. Some of the buoys became lost and are probably still adrift.

"There may be as many as five spheres as well as a few regular buoy signals adrift in the Gulf," the Coast and Geodetic Survey stated. "It is probable that this floating survey gear is now widely scattered. After a period of exposure to seas and weather, the black cloth targets on the buoy signals are destroyed, leaving a slender white wooden framework about 20 feet high which from a distance might conceivably be mistaken for a periscope."

Science News Letter, March 21, 1942

MEDICINE

Diphtheria Toxoid Treatment For Leprosy Fails In Trials

In Study of 71 Patients Volunteering, Control Group Did Better than Those Receiving the Toxoid Treatment

HOPE that diphtheria toxoid, the substance that protects against diphtheria, would prove a cure for leprosy is dispelled by its failure so far to improve the condition of leprosy patients at the U. S. Marine Hospital, Carville, La.

The treatment aroused widespread interest when an American medical missionary to Thailand, Dr. D. R. Collier, reported favorably on his results with the treatment which was first suggested by a German physician, Dr. Manfred J. Oberdoerffer.

Trial of the treatment was started at Carville in 1940. Of 11 patients given the treatment for more than a year, one is slightly improved, three are in a stationary state and the rest are in a worse condition than at the start of treatment, Dr. G. H. Faget and Dr. F. A. Johansen, of the U. S. Public Health Service, report (*Public Health Reports*, February).

In a more extensive and carefully controlled study, for which 71 patients volunteered, diphtheria toxoid was given to one-half the group and the broth from which it was made was given to the other half. The latter, control group, did better than the group given the toxoid.

The experimental treatment will be continued for another two months. After three months of further observation, a final report will be made.

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ASTRONOMY—PHYSICS

Sun Is Vast Magnet, Larger And Stronger Than Earth

Magnetic Poles of Sun Resemble Those on Earth in Being Removed From Rotational Poles But Less Distant

CLOSE relations between events on the sun and conditions on earth, due in part to the magnetic nature of both great globes, were traced in the Arthur Lecture, delivered at the Smithsonian Institution by Dr. John A. Fleming, director of the Department of Terrestrial Magnetism, Carnegie Institution of Washington.

The sun, Dr. Fleming stated, is a vast spherical magnet, on the same essential pattern as the earth, except of course that it is much larger. Force of its surface magnetic field is also much greater —about 100 times as intense as the earth's.

The magnetic poles of the sun resemble those of the earth in not being located exactly on the rotational poles. The eccentricity is not so great on the sun, however; its north magnetic pole is only four degrees removed from its north rotational pole, whereas the earth's magnetic north pole and rotational north pole are 11.5 degrees apart.

The sun's magnetism does not directly affect the magnetic field of the earth. Despite its hundred-fold greater magnitude, it is still too feeble to produce noticeable changes so far away. The great magnetic storms that sweep about the earth from time to time, almost always accompanied by auroral displays, are directly traceable to streams of electrical particles poured through space; these grow greater and less in step with changes in solar magnetism.

Magnetic storms, it should be pointed out, are not related to electrical storms or other visible and audible disturbances in the earth's atmosphere. These are relatively local affairs, whereas the great magnetic storms are world-wide, and are utterly silent and imperceptible to human senses. They make themselves evident mainly through their disruptive effects on wired and wireless communications when they are at their height.

Auroras, the only visible effects or concomitants of magnetic storms, are relatively remote affairs. Whereas the highest clouds of "weather" storms are only a few miles up, the lowest of the polar lights that have ever been measured have had altitudes of about 50 miles, and they range from that up to 300 miles.

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ASTRONOMY—PHYSICS

Most Powerful Magnetic Field Found in Sunspots

THE giant group of sunspots that was visible to the naked eye from February 25 to March 1 had the most powerful magnetic field ever measured at the Mount Wilson Observatory.

On two days the magnetic field attained the value of 5100 gauss. A strength of 3000 gauss is about average for most large spots. Although spots have been photographed and studied at Mt. Wilson on every clear day for over a quarter of a century, not one has ever exceeded this value. The spot-group was also remarkable in that it contained magnetic fields of opposite polarity almost in contact, like the north and south poles of a horeshoe magnet, instead of being widely separated as is usually the case.

The spot-group was held responsible for the violent magnetic storm which began about midnight on March 1 and lasted for 24 hours. The magnetic field of the spot itself is not believed to have caused the storm, but rather charged particles projected from the spot at a high velocity toward the earth. Frequently during magnetic storms telegraph and teletype service is disrupted and radio transmission seriously affected.

The spot-group is now out of sight on the side of the sun turned from the earth but should be brought into view again by the solar rotation about March 22.

Such a large outburst of solar activity is of exceptional interest in that it occurred only two years from the next predicted minimum in sunspot frequency. The last minimum of the 11-year cycle was in 1933 and maximum about 1937.

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Insects have been on earth for 50 million years; man for 500,000.

RADIO

Police Shortwave Systems Valuable Wartime Network

INTER-CITY police radio systems are so organized in at least 22 of the nation's largest cities and a number of smaller ones that they can play an important part in war efforts of their areas, a report to the International City Managers Association shows.

Police communications systems, virtually without change, can undertake prevention of escape of enemy agents across jurisdictional lines, prevention of large-scale sabotage and looting, facilitation of troop movements and civilian evacuation through coordinated traffic control, the report says.

Cities connected by police radio usually include a central city which clears messages, and as many as fifty other police jurisdictions in the metropolitan area. In most cases arrangements for co-operative broadcasting are made merely by exchange of correspondence.

When time is important, the Chicago system, for example, can mobilize 500 squad cars in Illinois, Indiana, Michigan and Wisconsin in five minutes.

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ASTRONOMY

Simon-Pure Red Star Blinks Like a Stop-Light

A FEW weeks ago the Harvard College Observatory received a radiogram from Prof. Jean Bosler, director of the Marseilles Observatory in France, announcing the discovery by astronomer R. Jonckheere of a "remarkable red star" and asked for its spectrum.

No spectrum of this star was to be found on any of the existing Harvard photographic plates, so Robert Fleischer made one with the observatory equipment on a red sensitive plate.

The star turned out to be truly red. All of its spectrum was confined to the red end of the rainbow sequence of colors, the end which does not photograph at all on a blue sensitive plate. The spectrum, examined by Dr. Dorrit Hoffleit, was declared to be of type Nb, to which only the reddest of the red stars belong.

The star itself was also photographed one night, both on a red and on a blue sensitive plate. It showed up brightly on the former, not at all on the latter.

However, the star was found on 120 Harvard plates taken during the past several years. Examination of these plates disclosed that the star varies—blinks—but takes about 500 days between blinks. At its brightest, it is about three magnitudes, or 16 times, brighter than at its dimmest. But even at its best it would still have to be 16 times as bright to be seen with the unaided eye.

The star is in the constellation Monoceros, which lies between Orion and Canis Minor, the Lesser Dog.

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MEDICINE

To Arrange Instruction In Kenny Treatment For Polio

A PLAN aimed at making the new Sister Kenny treatment for infantile paralysis more generally available is announced by the National Foundation for Infantile Paralysis. The treatment was originated and introduced into this country by Miss Elizabeth Kenny, an Australian nurse.

Under the Foundation plan, the University of Minnesota will arrange to teach certain physicians, physiotherapists and nurses Sister Kenny's technique. Later Foundation chapters will extend such training in cooperation with local agencies such as hospitals and health departments.

The limited number of trainees will depend upon the number of patients in the early stage of the disease being treated at Minneapolis Hospitals. The Kenny treatment is confined to such cases. Both the Foundation and the University are "doing all that is humanly possible to spread knowledge about this method of treatment of the acute stage of the disease."

Sister Kenny's treatment, reported to have made possible great improvement in cases usually considered "hopeless," substitutes exercise for splints and braces which immobilize the affected part.

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GENERAL SCIENCE

No Science at National Academy Annual Meeting

THE National Academy of Sciences has blacked-out the usual scientific sessions of its annual meeting to be held here April 27 and 28. Only business meetings will be held. Members of the press were notified officially that neither reporters nor photographers will be admitted to the Academy building during the meeting.

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IN SCIENCE

ZOOLOGY

Australia Destroys Its Dangerous Zoo Animals

GREYHOUNDS and dangerous zoo and circus animals were the first victims of the Japanese threat to invade Australia, according to the Australian News and Information Bureau.

Greyhounds were sent by their owners to the Society for the Prevention of Cruelty to Animals to be destroyed. Circuses and zoos likewise destroyed lions, tigers and leopards lest they break loose during air raids.

Science News Letter, March 21, 1942

ENGINEERING

Tiny Jet of Water Drills Steel and Hardest Metals

DRILLING a hole through a piece of hard steel with nothing more substantial than a tiny jet of salt water sounds fantastic. Yet that is just what Dr. Charles F. Burgess, former professor of chemical engineering at the University of Wisconsin, did to the astonishment of the Electrochemical Society of Chicago.

The hardest of metals, Dr. Burgess declared, can be drilled in this way, even tungsten carbide which can otherwise only be cut with a diamond.

The jet of salt water issued from a glass nozzle directed toward the steel plate. This nozzle was connected by a sealed in wire with the negative pole of a battery, the positive pole of which was connected to the plate. Thus an electrical circuit was established from the battery to the plate, up through the jet and back to the battery. The salt in the water made it a good conductor of electricity.

This is precisely the arrangement used in electro-plating, except that in this case the current is in the reverse direction and the metal is, so to speak, deplated. The metal torn off by the electric current, instead of being deposited on the other electrode, is washed away by the stream of water. Thus the jet wears its way through the metal.

Science News Letter, March 21, 1942

E FIELDS

CHEMISTRY

Phosphorescent Materials To Make Blackout Safer

See **Front Cover**

A SELF-PORTRAIT of glowing chemicals provides the illustration for the front cover of this week's SCIENCE NEWS LETTER. They are the kind that "phosphoresce" when invisible ultraviolet rays fall upon them and continue to glow for some time after the exciting rays are removed. Such chemicals have great possibilities for use in air raid blackouts, as luminous paint or fabrics to guide people in the dark. (See *SNL*, Mar. 7.) The chemicals were photographed by their own light, the room being otherwise completely dark. The scientist examining them is Dr. Gorton Fonda of the General Electric Research Laboratory.

Science News Letter, March 21, 1942

NUTRITION

Red Cross Reveals Diet of Americans in German Camps

FIRST accurate account of what American prisoners are fed in a German prison camp was made public by the American Red Cross, which described the diet as "slightly insufficient."

The American internees, about 300, are at "Ilag VII," a prison camp at Laufen, near Salsburg, Germany, and are reported badly in need of cloaks, clothing, underclothing and shoes by an International Red Cross Committee delegate who visited them. Headquarters here cabled $5,000 to Geneva, Switzerland, for purchase of needed clothes.

The diet which includes an unknown "food paste," is the same as in other prison camps and consists of per month, meat 1,325 grams; fish 248; margarine 720; cooking fat 320; food pastes 500; marmalade 770; potatoes 4 kilograms; cabbage, carrots 6 kilograms; sauerkraut 1080 grams. In addition there is a ration of 330 grams of bread per day. Usual menus: morning, tea substitute; noon, soup containing 40 grams meat, 25 grams beans, 10 of fat, a few potatoes; evening, same, sometimes kraut. Hygiene and disinfection were described as good. Internees are allowed one hot shower weekly.

Red Cross nutritionists here immediately set about calculating the value of this diet in terms of calories and plan to send food packages to the American internees to supplement their diet.

Neither Red Cross nor Government nutritionists here were able to say what the food pastes are. A guess was offered that they might be come kind of macaroni or other flour and water paste. The tea substitute also is unknown here.

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PUBLIC HEALTH

Trichinae Killed By Freezing in New Process

PORK can be made safe for human consumption, so far as any lurking trichinae are concerned, by proper freezing, U. S. Department of Agriculture scientists have determined. Sections of pork or pork products not more than six inches thick are freed of the dangerous parasites by exposure to a temperature of five degrees Fahrenheit for 20 days, or ten degrees below zero for ten days, or 20 degrees below zero for six days. Thicker pieces may be made safe by longer freezing.

The Department warns that in many food locker plants temperatures are not kept low enough to insure a complete kill in stored pork.

Science News Letter, March 21, 1942

PHYSICS

Army Uniforms To Match; Standard Shades Approved

IF you have a good eye for color you've noticed that seldom do two Army uniforms, officers or enlisted men, exactly match. All that is to be corrected now with an official Army "swatch book" giving standard colors for all articles of Army dress.

The book, which will cost clothiers $5.00, contains samples of cloth showing the approved shades of the various fabrics used by officers, warrant officers, enlisted men and personnel of the Army Nurse Corps.

Also standardized is a color for leather known as "Army Russet" for belts, boots and shoes.

Present Army uniforms for officers as well as enlisted men vary in color from tan, to khaki, to brown, to a brownish green. Official shade is "olive drab."

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PALEONTOLOGY

Find Evidences of Life Half-Billion Years Ago

FOSSILS showing that life existed half a billion years ago, in a shallow sea where the Appalachian mountains now rise, have been found in a series of limestone strata long thought to be barren of such evidences. The formation is described in a new publication of the Smithsonian Institution, by Dr. Charles E. Resser, paleontologist in the U. S. National Museum.

The strata constitute what is known as the Maryville formation. It crops up in many places in the long chain of Eastern mountains. Geologically, it is classified as of mid-Cambrian age. The fossils, mainly of ancient relatives of crabs and crayfish known as trilobites, are related to similar forms found in the Rocky mountains.

Science News Letter, March 21, 1942

ASTRONOMY—PHYSICS

Short Life So Far For Universe Suggested

A VERY short life for the universe so far—a mere two or three billion years — was suggested by new theories of evolution of the stars presented to the Inter-American Astrophysical Conference, by Prof. H. N. Russell of Princeton, leading authority of the life and death of stars.

This is only about the age of the oldest rocks on the earth and it may mean that the earth is as old as the rest of the universe.

Prof. Russell's new theory takes into account the recent ideas that the stars are kept shining by means of the energy they obtain from transmutations of the atoms that compose them.

The older ideas of 30 years ago, proposed by Prof. Russell at that time, pictured the stars as undergoing a regular evolution, one sort turning into another.

Prof. Russell now concludes that, puzzling as it may be, the white dwarf stars have not arrived at their present state through an evolutionary process but were "born" that way. The supergiants, blazing at a great rate, consume so much energy that they could not have kept up that pace during the new short lifetime of the universe. Prof. Russell therefore suggests that these stars had an existence during which they did not shine but were actually 170 degrees below zero Centigrade on their surfaces.

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MATHEMATICS

Calculus Before Cannon

Mathematics Becomes Interesting When Applied As a Potent Weapon in Solving Pressing War Problems

MATHEMATICS, bugaboo of so many people throughout their schooling, is taking on new importance as a highly specialized but potent weapon in the national war effort. In fact calculus has to come before cannons if we are to design and build the finest armaments in the world in our fight against the Axis powers.

The nation needs men who can apply higher mathematics to many of the problems arising in war industries. Certain kinds of improvements in the complicated weapons we use await the basic work of mathematicians, especially in the field of aeronautics. These men must be trained, and trained quickly.

The seriousness of the situation may not be apparent to the average man, but the "critical lack" of experts in applied mathematics and mechanics in this country has been recognized by the Committee on the Survey of Research in Industry, appointed by the National Research Council and reporting to the National Resources Planning Board.

Before Hitler and the war, most work in applied mechanics—which is simply mathematics put to practical engineering use—was done in Europe, especially in Germany. Interchange of information was free and uncensored, and American industry was kept abreast of all important developments. Today all this is changed. Nations at war do not give away technological secrets.

Special Training Programs

This challenge to our ingenuity is not going unanswered. Half a dozen top-flight colleges and universities in the United States have set up special training programs to turn out men who know how to make mathematics work overtime for defense. It is new territory for us, but we are making progress.

Brown University has a program of instruction and research in applied mathematics and mechanics which is probably as broad and as comprehensive as any being offered today. Some 80 men have taken up the opportunity to learn how they can put mathematical knowledge to work. More men will be ready to take over special assignments soon.

Begun experimentally last summer, the program was launched as the first full-time venture of its kind in this country. Now Brown has a full-year course of study, which will probably be continued. Tuition is free, fellowships are available, and registrations are being accepted for the second semester. Dean Roland G. D. Richardson of Brown's Graduate School is in charge.

Essentially the applied mathematician fits into the wartime production picture as an efficiency expert. He understands the nature of engineering problems, and he has had intensive specialized training in the basic theories of higher mathematics. These mathematical tools equip him to solve certain kinds of industrial headaches expertly, with speed and exactness.

The applied mathematician waves no magic wand, nor can he say "open sesame" to every problem which the engineer meets, but when the applied mathematician and the engineer join hands, a good many mountains become mole-hills. Some problems ordinarily dealt with only by trial and error can be reduced to essential theories of higher mathematics. The engineer's costly experiments can frequently be cut short or eliminated. Defense can be speeded up.

Let's see what applied mechanics, or applied mathematics, is all about. It ties in with such fields as aeronautics, hydrodynamics, thermodynamics, elasticity, plasticity, electricity and magnetism. By its very nature it is a broad subject. Brown is treating the field very broadly and comprehensively, too, in its six courses and seminar groups.

One of the fields of engineering in which applied mathematics is especially valuable is dynamics. Dynamics is the study of everything that moves, from planets to electrons. Because this is a war of machines, Brown's work in dynamics is of course focused upon a practical knowledge of dynamics as applied to industry.

The theory of the gyroscope belongs in the realm of dynamics. There is much to be learned about this amazing instrument. It is used to steer torpedoes, and is

WAR APPLICATION

A problem in the theory of airflight is being discussed by Prof. Richard Mises (right) and Prof. Stefan Bergmann (center) with three future aeronautics experts.

MACHINE MATHEMATICS

Computing with calculating machines is being taught the advanced students who are also trained in graphical methods of applied mechanics, which will fit them for the kind of mathematical work required in war industries.

a key part of the "automatic pilot" and bomb-sights. At Brown, students are being taught the basic mathematical principles involved.

The problem of building the most efficient kind of ships involves questions like those of friction between water and a ship's hull, the energy spent in creating waves, and the push of a ship's screws. Behind all this lies the field of fluid dynamics, involving water-pressure, the behavior of currents, and other forces. The same field applies to conditions that planes meet in flight, with the air as the "fluid."

One aviation company in the United States is at work on problems connected with the physics and thermodynamics of aircraft heating and ventilating systems. The company wants to know more about heat balance factors throughout the induction system of carburated gasoline.

Another aviation concern is studying the dynamics of tricycle landing gears, the effect of wing deflections upon dynamic stability of planes in flight, and brake chatter for a wheel mounted on an axle flexible in bending and in torsion. These are all practical problems in dynamics where the applied mathematician could be of help, and are typical of the research on which the faculty and students at Brown are working.

The theory of vibrations belongs to the field of dynamics. It is easy for soldiers marching across a bridge to break step and avoid setting up serious vibrations which might make the bridge collapse, but it is not as simple to cut down serious vibrations in the complex machines of combat.

A typical problem confronting plane manufacturers is applying this theory to three-dimensional wing-flutter, a serious matter now that engines, cannon and other equipment are carried in plane wings. Vibration problems of a difficult nature have also come up in warships of various kinds. Modern battlewagons contain more machinery than any other vessels ever built.

Because every kind of material has definite elastic properties, elasticity is a key field of knowledge and is being treated accordingly at Brown. The theory of elasticity, with its far-flung mathematical ramifications, can be used to study such different problems as the twist of a ship's propellershaft, the expansion of a gunbarrel, and the bending of metal plates in aircraft during flight.

Engineers and designers of tanks, warships, cannons and bombers must know a good deal about the strength of materials, which is another way of describing elastic and plastic properties. They must be able to predict with mathematical exactness the initial buckling stress, the stress at which the buckles become permanent, and the yield strength and ultimate strength of the entire structure.

Airflight Theory

The theory of airflight was born after the Wright brothers had sent the first plane aloft at Kitty Hawk. Its modern ramifications include among other things the theory of air-wings and lift, pressure on wings and fuselage, and the theory of airfoils and propellers.

High speeds of modern planes bring about complications for the designer and engineer. One of these problems has to do with propeller efficiencies. At speeds approaching 500 miles per hour, engineers have found that radical changes must be made in propeller designs. Here is a field where applied mechanics can do yeoman's work.

To understand and use the theories of applied mechanics, the students at Brown must fly high into the rarefied atmosphere of the science. Their life-sustaining mathematical equipment includes a baffling array of signs and symbols amazing in their complexity. Because facility with these symbols and an understanding of their use is as im-

portant as a carpenter's knowledge of his tools, Brown is offering courses in partial differential equations and numerical and graphical methods of applied mathematics.

If Hitler's code and the war have done anything on the credit side for this country, it has been to drive scholars and research men across the Atlantic to the free colleges and universities here. The men who are teaching at Brown, including those who years ago refused to work with the Nazis, are among the best that Europe has produced.

There are Prof. Willy Prager and Prof. Richard von Mises, both of whom left Germany and went to the University of Istanbul when Hitler rose to power. Prof. Prager, in pre-Hitler days, was acting director of the Institute of Applied Mechanics of the University of Gottingen, structural inspector for the German Airsport League and scientific adviser to the Fiesler Aircraft Company, one of Germany's largest plane manufacturers.

Prof. von Mises' field is the theory of aeronautics. His research as professor at the Technological Institute in Dresden and as director of the Institute of Applied Mathematics at the University of Berlin was an outstanding contribution to the development of modern aircraft efficiency.

Prof. Stefan Bergmann is a Pole. Before coming to the United States he was an instructor and lecturer at the Institute of Applied Mechanics at the University of Berlin, and taught at the Technological Institute of Tomsk. Part of his research was done for the German Department of Airplanes. Prof. Willi Feller, a German, is the former head of the Institute of Applied Mathematics at the University of Kiel, and has taught for many years at the University of Stockholm.

From Canada has come Ireland-born Prof. John L. Synge, head of the Department of Applied Mathematics at the University of Toronto. Prof. Synge commutes by plane every week-end between Providence and his home city.

Prof. Jacob D. Tamarkin, a Russian, is one of the editors of *Mathematical Reviews,* an international journal of higher mathematics published at Brown. Before coming to the United States in 1925 he taught at the Electro-technical School of Petrograd and at the Petrograd School of Railroads.

What Brown has done so far has been made possible through the support of the United States Office of Education and the Carnegie Corporation.

Plans are being prepared to make the program a permanent one.

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PUBLIC HEALTH

Major Typhus Epidemic In England or Germany Unlikely

In Addition to Focus of Cases, Big Epidemic Depends On Disorganized Population; Delousing Effective

A MAJOR epidemic of typhus fever is unlikely in either England or, for the present at least, in Germany proper, even though the disease is widely prevalent, according to reports in German-occupied countries and in Spain and perhaps in northern Africa.

Lice spread the disease, but it is not solely attention to cleanliness, and therefore fewer lice, that will help protect England and Germany from typhus fever epidemics.

Two other factors are essential for the development of a major typhus fever epidemic: 1. A focus of typhus fever cases from which the lice can spread the disease; 2. A disorganized population.

"No big epidemic of typhus fever has ever taken place unless, in addition to lice and a typhus focus, there was also a badly disorganized population," Dr. R. E. Dyer, newly-appointed director of the National Institute of Health, U. S. Public Health Service, said emphatically.

Dr. Dyer is an authority on typhus fever, having established the fact that endemic typhus fever in the United States is spread by the rat flea, instead of the body louse which spreads European typhus.

War, famine and civil revolutions are the conditions necessary for the kind of disorganization of populations that is the third factor required to fan typhus fever into a large epidemic.

Famine certainly is not present in England nor, according to reports, in the Reich proper. War has failed to disorganize the population in England and there are no reliable reports of any such disorganization in Germany.

Steps must, of course, be taken and apparently are being taken to prevent the spread of typhus to the populations in England and Germany from soldiers returning from tyhus fever areas and from war prisoners and refugees.

Delousing is one effective measure of preventing the spread of typhus fever. It was extensively practiced among the armies on the Western Front in World War I. Troops in the trenches could be frequently relieved and sent to the rear for short periods for delousing. Such a procedure is not practical under conditions of open warfare.

Those who survive an attack of typhus fever are immune to the disease. This is believed to give the Russians some advantage at present, since large numbers of men in the Russian army now may have acquired immunity to typhus during the epidemic in Russia between 1917 and 1921. The Germans are not immune.

Vaccines against tyhus fever have been developed, but so far none has proved satisfactory. One developed by Dr. Herald R. Cox, of the U. S. Public Health Service, is being tested in Bolivia. It is too early for results of these trials to be known. No typhus fever has as yet been reported among either vaccinated or unvaccinated in the haciendas where the vaccine is under trial.

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Calcium carbonate, in the form of precipitated chalk, is used as an abrasive in tooth pastes and powders, and in silver polishes.

Onyx is calcium carbonate colored with a mixture of limestone and clay.

New Machines And Gadgets

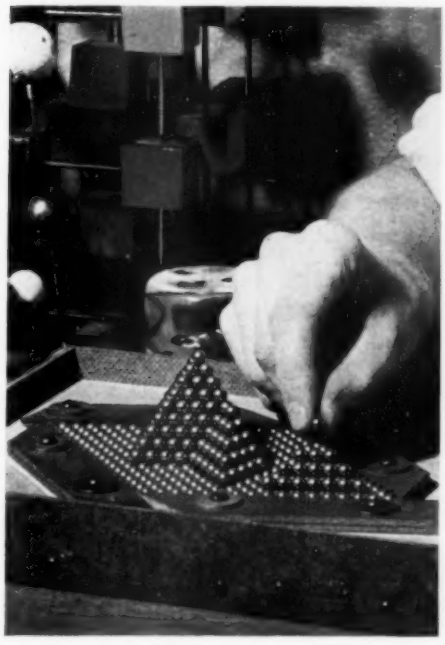
Novel Things for Better Living

Lightweight concrete in many new forms is announced by the Bureau of Mines. In place of rock and sand, use is made of slag, cinders, volcanic scoria, treated shales or clay, pumice and even sawdust. Yet the concrete is strong as well as light, making possible taller buildings, longer bridges, and stronger fireproof walls.

The danger of using a 110-volt lamp when working in a damp all-metal enclosure such as a steel tank, boiler or ship can be avoided by using a step-down transformer that reduces the voltage to a harmless six volts. Such a transformer is available provided with a cord that can be plugged into any regular 110-volt outlet. A similar outlet is provided on the low-voltage side of the transformer into which the cord of a six-volt lamp can be plugged.

Washable catalogue cards for libraries have been devised to meet the huge soiled-card problem. A thin foil of cellulose acetate is melted on the card stock, and forced into the fiber by heavy pressure without the use of an adhesive. The film so produced is only .00088 of an inch thick. Even the edges of the cards are sprayed with a waterproof lacquer so that the whole card is completely waterproof. By use of a special typewriter ribbon, it is even possible to type on the treated stock and the cards become washable again after 24 hours.

The steel balls in the illustration above are being built up to show the arrangement of the atoms in a crystal. Each ball represents an atom but is 20,000,000 times the size of the real thing. The particular arrangement shown is the most compact possible. Each atom inside the crystal is touched by 12 surrounding atoms. This arrangement occurs in elements such as aluminum, silver, gold, calcium, copper. In the background are crystal models of compound substances like salt and calcium carbonate. In these the atoms are spaced. The arrangement and spacing are determined by X-ray diffraction patterns.



A new adhesive of vinyl resin has been developed to replace the now scarce rubber cement. It is especially useful for attaching leather or fabrics to metal, as in spectacle cases, glass, fiber and transparent cellulose. After drying, the resin is non-adhesive at ordinary temperatures.

Shoelace tips are now being made of a cellulose nitrate plastic in place of metal. The shoelace tip may be a tiny thing, but it is estimated that half a billion laces were plastic tipped last year, and in this application one pound of plastics may release more than three pounds of war-needed metal. And plastic tips do not cut or scratch the shoelace yanker.

A metal screw has been devised that does not wear out the thread in a plastic or other comparatively soft material in which it may be used. A hard helical wire spring, formed to fit the thread, is first screwed into the threaded hole. The thread on the screw is round-bottomed to fit the wire, so that when the screw is screwed into the hole, it rides on the wire and never touches the original thread in the plastic. Consequently, however often removed or screwed in again, it causes no wear on the plastic thread. The screw was originally designed for aircraft construction, but obviously has many other uses.

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, *1719 N St., N. W., Washington, D. C., and ask for Gadget Bulletin 95.*

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●RADIO

Saturday, March 28, 1:30 p.m., EWT

"Adventures in Science," with Watson Davis, director of Science Service, over Columbia Broadcasting System.

Dr. Morris Meister, principal, Bronx High School of Science, will tell how science teaching can help in the war emergency and how boys and girls belonging to science clubs can help in the war effort.

Tuesday, March 24, 7:30 p.m., EWT

Science Clubs of America programs over WRUL, Boston, on 6.04 and 11.73 megacycles.

Dr. Charles Brooks, of the Blue Hill Observatory, will discuss "March Weather Changes the World Over."

One in a series of regular periods over this short wave station to serve science clubs, particularly in the high schools, throughout the Americas. Have your science group listen in at this time.

ETHNOLOGY

Australians Do Not All Look Like Western Cowboys

CONTRARY to what most Americans think, Australians are not all tall, lanky fellows looking like western cowboys, but come in all shapes and sizes, according to C. Hartley Grattan's new book, Introducing Australia. (*Reviewed, SNL, this issue.*)

"Australians," says Mr. Grattan, "like the Nova Scotia farmer's foot, are long and short, broad and narrow, and wide."

Another myth the book explodes is that Australians speak cockney. Words containing "a" and "ai", however, are likely to be pronounced as though they contained a long "i". Generally their speech is less rhetorical than that of Americans, and their slang, next to American, "is the most vivid, vigorous, and comprehensive in the world."

According to Mr. Grattan, Australians use many American slang terms, but often completely change the meaning. Thus "grafter" in Australia means a hard worker, and not one who makes off with public funds. Most commonly used slang term in Australia is "bloody" and the number of times an Australian swearer can use it in a conversation is "incredible."

Favorite Australian sport is cricket, while baseball is a minor sport. The big sporting event comparable to our World Series, is the periodical matches between Australian and English cricket teams played alternately (before the war) in the two countries.

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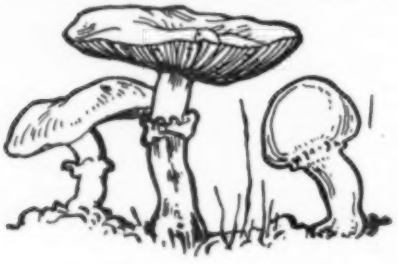
BIOLOGY

NATURE RAMBLINGS

by Frank Thone



Parasites and Saprophytes

ODDLY enough, the twin-word of "parasite" has never become a part of the common English vocabulary.

We all have a pretty good idea of what a parasite is. A parasite is an animal or plant that attaches itself to another (usually larger) animal or plant and proceeds to feed on the body substance of its unwilling host instead of getting its own living honestly. Fleas and lice are parasites, so are the mushrooms and bracket fungi we find growing on tree trunks, and the lesser fungi that cause plant diseases, and the bacteria and disease-causing protozoa within our bodies, and a host of other disagreeable creatures.

Twinned with "parasite," but relatively little heard of, is the word "saprophyte." Interestingly enough, this contrasting word is used only by botanists.

There is a reason. Animals that are not parasites feed on prey that is dead before they begin to eat—or that may be eaten alive but certainly dies quickly during the eating process, like a mouse in the jaws of a cat or grass in the cud of a cow. That way of living seems entirely honorable among us animals.

But among plants it isn't. Really free- and independent plants don't depend on prey, living or dead. With the green stuff that colors their leaves and often their stems as well, they drink in the energy of sunlight and with its aid they make their own food out of water, carbon dioxide from the air, and minerals from the soil. No animal can do this. So among animals there is no need for the twin-term of "parasite," which is "saprophyte."

"Saprophyte" comes from two Greek words, which in this combination means "decay-plant." Saprophytes include some of the higher plants, like the pallid Indian-pipe found in moist woods, but most of the class are bacteria and fungi. The mold that spoils bread and gets on damp shoes, the mushrooms that grow on a dead stump, the bacteria that reduce bruised apples to masses of rotten pulp, are all examples of saprophytes.

To sum up: Plants can be divided into three classes, according to their feeding habits: parasites, saprophytes, free-living. Animals have only two classes: parasites and . . .? There isn't any generally used contrasting term. We might call them simply devourers, or if we must go Greek for a word, "phagozoa."

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SCIENCE CLUBS OF AMERICA

Sponsored by Science Service

NEWS OF CLUBS

BUFFALO, N. Y.—Six western New York High Schools, three of them in Buffalo, took the awards in the Third Annual Salon in Photography which was held at the Buffalo Museum of Science from February 28 to March 8. The Salon was sponsored by Science Service, the Science Section of the Western Zone of the New York State Teachers Association and the Buffalo Museum of Science. The grand prize went to Albert Cotriss of Medina; first prize, senior class pictorial, to Beth Stube of La Salle Junior High School; first prize, portrait, senior class to Ann Johnson of East Aurora and first prize, scientific, went to Robert Saunders of Medina. The pictorial prize winner in the junior class was Daniel Torrel of Buffalo. For the most part inexpensive cameras were used. A pinhole camera, made by Miss Hoyt at a cost of only 28 cents, was used to take a photo which was considered to be worthy of honorable mention in senior class, pictorial.

The schools represented among the award winners are East High School, Riverside High School, and St. Joseph's Collegiate Institute in Buffalo; La Salle Junior High School, Niagara Falls; East Aurora High School; and Medina High School.

ALBION, Mich.—G. W. Prescott, Associate Professor of Biology, Albion College, chairman in charge of the formation of a Junior Academy of Science in Michigan, reports steady progress in this project. The shortage of scientists and mathematicians as well as skilled craftsmen is being felt keenly in this state and the need for early training in these fields is lending impetus to the formation of this Junior Academy.

Such an organization will tie together the efforts of all the young amateurs in the state and will result in mutual benefit to all those participating in the activities of such a body. The many science clubs affiliated with Science Clubs of America are heartily in favor of such an organization and it is hoped that the newly forming Junior Academy will assist and encourage the formation of many more clubs in the state. Mr. Prescott will welcome correspondence from any and all science clubs in the state.

STATE COLLEGE, Miss.—Clay Lyle, head of the department of Zoology and Entomology at Mississippi State College, has stirred up interest in science clubs at the recent meeting of the Mississippi Academy of Science at Jackson and spoke on this subject at the Mississippi Educational Association on March 13. At present there are a relatively small number of clubs in this state but most of them are pioneers in this field. Their example is encouraging establishment of other clubs here where the Junior Academy of Science is a growing organization under the chairmanship of Dr. Lyle. Clubs in this state are urged to join in this very excellent undertaking by writing to Dr. Lyle.

BALTIMORE, Md.—The Camera Club of Gwynns Falls Park Junior High School has been getting a lot of practice lately in taking, developing, printing, enlarging and coloring pictures. The members have attained such proficiency that not only do they finish their own photo work but they also complete photographic processes for members of the faculty. This Club, sponsored by Josephine C. Kelly, chairman of the science department, also is affiliated with the Maryland Junior Academy of Sciences.

Clubs are invited to become affiliated with SCA for a nominal $2 for 20 members or less. You can become an associate of SCA for 25 cents. Address: Science Clubs of America, 1719 N St., N.W., Washington, D. C.

•First Glances at New Books

Additional Reviews On Page 192

ORNITHOLOGY

THE PIGEON—Wendell Mitchell Levi—*R. L. Bryan Co.*, 512 p., illus., $10. This is a work that cannot be called anything less than encyclopedic. The author, one-time officer in charge of carrier pigeons with the A.E.F., has made the domestic pigeon his life study, and he makes available here the concentrated fruits of his work. He sketches briefly the history of the pigeon (which is as old as the history of civilization), describes and illustrates in detail all the standard breeds and varieties, provides highly informative chapters on pigeon anatomy, physiology, genetics and behavior, gives directions for care and housing of the birds in health and sickness, and finally tells of pigeon fanciers' organizations and their work. There is also a bibliography of several hundred titles.

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ENTOMOLOGY

THE TRIBE MONOCHAMINI IN THE WESTERN HEMISPHERE (Coleoptera; Cerambycidae)—Lawrence S. Dillon and Elizabeth S. Dillon—*Reading Public Museum and Art Gallery*, 135 p., 5 pl., $2.25 (Scientific Publication, No. 1). This first number in a new series of scientific publications is devoted to a monograph on a group of beetles that have long awaited adequate treatment.

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ARCHAEOLOGY

EVIDENCES OF EARLY OCCUPATION IN SANDIA CAVE, NEW MEXICO, AND OTHER SITES IN THE SANDIA-MANZANO REGION—Frank G. Hibben and Kirk Bryan—*Smithsonian Institution*, 64 p., pls., 45c. (Smithsonian Misc. Coll. Vol. 99, No. 23.)

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AERONAUTICS

FLIGHT, AIRCRAFT ENGINES, A General Survey of Fundamentals of Aviation—Ray F. Kuns—*American Technical Society*, 303 p., illus., $3.25. All types of modern aircraft engines are dealt with in a simple practical manner.

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AERONAUTICS

FLIGHT, METEOROLOGY AND AIRCRAFT INSTRUMENTS, A General Survey of Fundamentals of Aviation—Bailey Wright, W. E. Dyer and Rex Martin—*American Technical Society*, 348 p., illus., $3.25. Everything that the airman should know about weather, aerial photography, maps and map making, aviation radio, air markers, aircraft instruments, etc., is here told with the help of excellent illustrations.

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PLANT PATHOLOGY

COLOR HANDBOOK OF CITRUS DISEASES—L. J. Klotz and H. S. Fawcett—*Univ. of California*, 90 p., 40 color plates, $3.50. A handy reference book for the citrus grower and plant pathologist. Accurately colored plates and terse text pages are ring-punched for ready changes or additions, and the whole is conveniently pocket-sized and buckram-bound for outdoor use. "A book in the field is worth ten on the shelf."

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BIOLOGY

ALPHABET OF THE SEA; A Handbook for Children—Nelle Caesar—*Christopher Pub. House*, 114 p., illus., $1.25. An unusual ABC book, from A for Abalone to Z for Zoophytes. Quiz sections at the end of each short chapter give parents or group leaders opportunity to instruct while entertaining. Quality of some of the halftones could be improved.

Science News Letter, March 21, 1942

DENDROLOGY

TREES OF THE EASTERN UNITED STATES AND CANADA, Their Woodcraft and Wildlife Uses—William M. Harlow—*Whittlesey House*, 288 p., illus., $2.75. A pocket-sized manual, with good popular descriptions, many halftones and several photocolor plates. Good for either schools, woodcraft groups or for the individual interested in trees.

Science News Letter, March 21, 1942

PLANT PATHOLOGY

ADVENTURES IN THE PLANT-DISEASE WORLD—Howard S. Fawcett—*Univ. of California*, 34 p., illus., 50c. A reminiscent essay, in which one of the best-known of American plant pathologists tells of some of his own efforts and successes.

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MATHEMATICS—EDUCATION

A BIBLIOGRAPHY OF MATHEMATICAL EDUCATION—William L. Schaaf—*Stevinus Press*, 144 p., $1.50. A classified index of the periodical literature since 1920, containing over 4000 references.

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ORNITHOLOGY

AMERICAN BIRD SONGS—Recorded by the Albert R. Brand Bird Song Foundation, Laboratory of Ornithology, Cornell University—*Comstock Pub. Co.*, 6 records, $5 per album. There are six of these albums, each containing six double-sided records, each side giving the songs of six birds. A complete set should be invaluable for institutions offering courses in ornithology, as well as for museums that endeavor to make their subjects as "alive" as possible.

Science News Letter, March 21, 1942

EDUCATION—ECONOMICS

AMERICAN YOUTH, An Enforced Reconnaissance—Thacher Winslow and Frank P. Davidson, eds.—*Harvard Univ. Press*, 216 p., $2.50. In the foreword, Mrs. Eleanor Roosevelt says: "Totalitarianism holds out no real solution for youth's problems, though we can learn much from the analysis of its appeal to youth as presented in this volume. Any final solution of American youth's problems must be firmly based upon the principles of democracy—the most civilized form of government. This is, admittedly, a tremendous task, calling for a highly educated citizenry that can govern themselves with wisdom and justice"

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GEOGRAPHY

INTRODUCING AUSTRALIA—C. Hartley Grattan—*John Day*, 331 p., illus., $3. After 14 years of travels over that continent, which included every state, most of the cities, and scores of by-paths, Mr. Grattan introduces Americans to their fellow-partners in this war. See also page 189.

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AGRICULTURE

SOILS AND FERTILIZERS (3d ed.)—Firman E. Bear—*Wiley*, 374 p., illus., $3.50. A new edition of a well-planned and successful book, useful alike for classroom and general reference purposes.

Science News Letter, March 21, 1942

SOCIOLOGY

AN INTRODUCTORY TO SOCIOLOGY—John Lewis Gillin and John Philip Gillin—*Macmillan*, 806 p., illus., $3.75. This textbook is the joint work of a professor of sociology at the University of Wisconsin and an associate professor of anthropology at Duke University.

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•First Glances at New Books

Additional Reviews On Page 191

METEOROLOGY

ATLAS OF CLIMATIC TYPES IN THE UNITED STATES, 1900-1939 — C. W. Thornthwaite in cooperation with Div. of Climate and Crop Bureau, U. S. Weather Bur.—*Govt. Print. Off.*, 95 pl., $1.25. A series of climatic maps of this country, showing conditions annually for 40 years (1900-39 inclusive). Maps are presented in pairs, one showing climate for the entire year, the other for the March-August crop season. In addition, there are "smoothed" maps showing frequencies of climatic conditions from arid to superhumid. The compilation was made with WPA assistance.

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AERONAUTICS

AIRCRAFT SHEET METALWORK—J. W. Giachino—*Manual Arts Press.* Part I, The Textbook, 123 p., illus., $1.96; Part II, Workbook in Blueprint Form, 58 p., blueprints, 96c. For the instruction of workmen who will produce our "125,000 airplanes."

Science News Letter, March 21, 1942

PSYCHOLOGY

CONTRIBUTIONS TO A PSYCHOLOGY OF BLINDNESS — Samuel Perkins Hayes—*American Foundation for the Blind*, 296 p., $2.50. Deprivation of one of the most important of the senses creates special problems and results in special compensations for the blind. This book may lead to better understanding of them.

Science News Letter, March 21, 1942

ECONOMICS

NATIONAL INCOME AND ITS COMPOSITION, 1919-1938—Simon Kuznets, Lillian Epstein and Elizabeth Jenks—*National Bureau of Economic Research*, 929 p., 2 vols., $5. Of interest to economists and others concerned with the nation's financial structure.

Science News Letter, March 21, 1942

AERONAUTICS

THE WONDER BOOK OF THE AIR (Rev. ed.)—C. B. Allen and Lauren D. Lyman—*Winston*, 340 p., illus., $2.50. A new and revised edition of a boy's book on aviation.

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WAR PSYCHOLOGY

WE PRISONERS OF WAR—Tracy Strong, ed.—*Association Press*, 90 p., $1. Sixteen soldiers speak from a prison camp, and interestingly many of them mention the need for mental recreation and the opportunities they hope to have to study science and other things that will be of use to them after the war. This emphasizes the usefulness of getting scientific literature to men of science who are prisoners of war.

Science News Letter, March 21, 1942

TECHNOLOGY

WOODWORKING WORKBOOK FOR HIGH SCHOOLS—Talmage Nichols and Harold L. Stiles—*Manual Arts Press*, 63 p., illus., 56c (price revision).

Science News Letter, March 21, 1942

LANGUAGE

PAN-AMERICAN SPANISH SELF-TAUGHT —Francisco Ibarra—*Random House*, 337 p., $2.50. "By following the method of this book, the student will acquire the ability to speak a simple, comprehensible and accurate Spanish in any of the South American countries within a period of less than three months," states the author; and so he will, if he will study it. Helpful features are a list of the local idioms of specific countries, which differ considerably from Castilian Spanish, and eleven pages devoted to the Portuguese language.

Science News Letter, March 21, 1942

BIOGRAPHY

LIBERATORS AND HEROES OF MEXICO AND CENTRAL AMERICA—Marion Lansing —*Page*, 299 p., illus., $3. Vivid and readable biographical sketches of a number of leaders in the national development of our Spanish-speaking neighbors to the south. Most of them are men largely unknown in this country; yet their past deeds will inevitably influence our own present and future.

Science News Letter, March 21, 1942

TECHNOLOGY

PLASTIC MOLDING, A Comprehensive Study—D. A. Dearle — *Chemical Pub. Co.*, 131 p., $4. A detailed technical description of this craft suitable for use as a text.

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ANTHROPOLOGY

PHYSICAL MEASUREMENTS OF YOUNG CHILDREN: A Study of Anthropometric Reliabilities for Children Three to Six Years of Age—Virginia Bergstresser Knott—*Univ. of Iowa Press*, 99 p., illus., $1.35 cloth; $1 paper.

Science News Letter, March 21, 1942

FICTION—METEOROLOGY

STORM—George R. Stewart—*Random House*, 349 p., $2.50. This book is one of the most remarkable works of fiction that has appeared in several years. Its principal character is not a person but a great atmospheric disturbance, the life history of which is traced from its birth in the western Pacific to its final passing over the plains of North America. So skilfully does the author weave its influences through the lives of the numerous human protagonists that one feels it quite appropriate for the storm to have a personal name. Only, the "Maria" tossed at it by a somewhat flippant young Weather Bureau worker seems a bit light; it might have been called Lachesis, or even Atropos.

Science News Letter, March 21, 1942

PHYSICS

PSYCHROMETRIC NOTES AND TABLES (rev. ed.)—Elmer Torok—*North American Rayon Corporation*, 125 p., $2. The purpose of this handbook is to gather in one small volume all essential information concerning air conditioning. In this revised edition, the material has been brought up to date and made more convenient to use.

Science News Letter, March 21, 1942

GEOGRAPHY

JEAN DOMENIQUE CASSINI AND HIS WORLD MAP OF 1696—Lloyd A. Brown —*Univ. of Mich. Press*, 79 p., illus., $5. The Curator of Maps of the William L. Clements Library presents a brief and interesting history of early map-making, including Cassini's own instructions as to the making of geographical and astronomical observations. Only four copies of the original *Planisphere Terrestre* are known to exist, but recently a collotype facsimile was printed, hand-colored after the original in the Clements Library.

Science News Letter, March 21, 1942

AERONAUTICS

AIR PILOT TRAINING—Bert A. Shields —*Whittlesey House*, 602 p., illus., $4. A textbook for civilian pilot training containing within a single volume material on all the subjects required for the license examination. No previous technical education is assumed, and elementary principles are covered in the fields of theory of flight, aircraft engines, meteorology, and air navigation.

Science News Letter, March 21, 1942